

# THE MINERAL INDUSTRIES OF THE NORTHERN BALKANS

## BULGARIA AND ROMANIA

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### BULGARIA

Bulgaria's mineral industry included the mine output of ferrous and nonferrous metals, mineral fuels (mainly coal), and such industrial minerals as clays, gypsum, and rock salt. Additionally, the metallurgical sector smelted and refined copper, gold, iron and steel, lead, silver, and zinc. Cement, dimension stone, and other construction materials also were produced. On a world scale, however, Bulgaria's minerals industry was small and of only regional importance. Although most of the country's minerals requirements were met through domestic production, the country continued to depend on imports of copper ores, iron ore, lead and zinc ores, steel, and mineral fuels.

According to the International Monetary Fund (2004<sup>1</sup>), Bulgaria's gross domestic product (GDP) based on purchasing power parity grew by about 7.1% in 2003 compared with that of 2002. Industrial production, which accounted for about 28% of the GDP, grew by about 5% (U.S. Central Intelligence Agency, 2004). Foreign direct investment (FDI) in the economy amounted to about 7% of the GDP compared with 5.8% of the GDP in 2002 (International Monetary Fund, 2004, p. 28).

The new legal structure upon which the country's privatization process was based was an important factor in the increase of FDI (European Bank for Reconstruction and Development, 2001, p. 23.). The Government remained committed to transforming the economy to a market-based economic system. The Law on Transformation and Privatization of State and Municipal-Owned Enterprises was adopted by Parliament in 1992, and the Underground Resources Act was adopted in 1998; these laws were adopted to promote private enterprise and foreign investment. Although the Underground Resources Act stipulates that underground mineral wealth is the property of the state, it provides for claims by domestic and foreign companies to be approved for the development and operation of mineral deposits for up to 35 years with additional 15-year extensions. Exploration rights to private companies could be granted for up to 3 years (Kousseff, 1999). In addition, the National Program for Sustainable Development of Mining in Bulgaria was drafted and approved in 1998. The Government continued to work to improve the country's environmental condition.

### Commodity Review

#### *Metals*

Metals have been a substantial component of the mineral industry's production. Bulgaria's mine output included copper, iron, lead and zinc, and manganese. Additionally, byproduct gold, molybdenum, silver, and other metals have been produced, chiefly from the processing of copper and lead and zinc ores and concentrates. Bulgaria's production of primary aluminum shapes (ingot) was based entirely on aluminum scrap.

**Copper.**—In 2003, Bulgaria's copper mining and processing sector reported production gains of about 10%, 3.2%, and 1.5% for smelter copper, refined copper, and copper ore, respectively, compared with levels of production attained in 2002 (table 1). Bulgaria's major copper deposits were developed and exploited in the Srednogorie-Panagurishte region of the country; three mines were in operation—the Asarel-Medet and the Elatsite surface mines and the Chelopech underground mine.

The Pirdop copper smelter and refinery (owned and operated by N.V. Umicore S.A. of Belgium) remained the principal producer of copper in Bulgaria. Facility expansion at Pirdop undertaken by Umicore to raise capacity for anodes to 215,000 metric tons per year (t/yr) and for electrolytically refined copper to 45,000 t/yr was completed in late 2002. In 2003, Pirdop produced 213,000 metric tons (t) of anode, which exceeded anticipated output for the year by 3,000 t (N.V. Umicore S.A., 2004).

The Chelopech mining operation, which was located about 70 kilometers east of Sofia, worked a polymetallic deposit that contained mainly copper and associated precious metals (gold and silver). Although the Chelopech Mine was primarily considered to be a gold producer owing to the much higher value of gold produced, the copper content of the ore averaged about 1.6%, and copper ore production ranged from about 8,000 to 10,000 t/yr. In 2003, Dundee Precious Metals Inc. (Dundee) of Canada acquired Bulgarian mining and exploration assets from Navan plc of Ireland. Besides Chelopech, these assets included several areas of gold exploration (Dundee Precious Metals Inc., 2003).

**Gold.**—Total gold production in 2003 was in excess of 2.1 t. Gold production, however, declined by about 18% compared with that of 2002.

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<sup>1</sup>References that include a section mark (§) are found in the Internet Reference(s) Cited sections.

Hereward Ventures plc of the United Kingdom continued to explore for gold in Bulgaria. The company's six exploration permits in 2003 encompassed an area of about 880 square kilometers (km<sup>2</sup>). Major exploration areas included the Chaira and the Tashkala Hill deposits that held resources of gold that amounted to about 23,300 kilograms (about 750,000 troy ounces). In 2003, Hereward also reacquired 100% interest in the Gornoseltsi and the Rosino deposits from Gold Fields Ltd. Six exploratory bore holes were completed at the Gornoseltsi deposit, which covered a 10-km<sup>2</sup> area; however, only minor gold values were found. Exploration for gold conducted thus far in the Rosino permit area, which is located near the border with Greece, had located gold resources that amounted to about 9,300 kilograms (more than 300,000 troy ounces) (Hereward Ventures plc, 2004, p. 4, 7).

Dundee also acquired development rights at the Ada Tepe deposit, which is located near Krumovgrad, and several exploration licenses that covered areas in the central and eastern Rhodope region.

Dundee planned a \$40 million investment program at the Chelopech Mine, which would include facility expansion that would increase milling capacity to about 1.5 million metric tons per year (Mt/yr) from 600,000 t/yr. A comprehensive feasibility study of Ada Tepe was to be available for banks in 2005 (Dundee Precious Metals Inc., 2004, p. 6, 7).

**Iron and Steel.**—In 2003, Bulgaria's production of crude steel increased by about 4.8% compared with that of 2002. Although constituting a small proportion of the feedstock required by the iron and steel sector, domestic production of iron ore (Fe content) increased by about 21% compared with iron ore output in 2002 (table 1).

In 2003, Sidenor S.A. of Greece increased its equity holding in Stomana AD to 80% from 75% in 2002. Sidenor also announced a modernization plan for Stomana that called for upgrading the continuous bloom caster and two rolling mills for long products. The modernization program also called for raising the utilization of capacity of Stomana's three electric arc furnaces (EAFs) to 800,000 t/yr of crude steel from 500,000 t/yr. Although the total nominal EAF steelmaking capacity was 1.1 Mt/yr, only two of the three EAFs were operating during the year. The modernization plan would cost about \$63 million<sup>2</sup> and could be financed partly with the assistance of international financial institutions. The International Finance Corporation studied Sidenor's modernization plan for Stomana as a preliminary step in underwriting the plan's financial requirements (International Finance Corporation, 2003).

Major modernization activities at the Kremikovtzi Iron and Steel Works (Finmark Ltd., 71% equity) continued during the year. In addition to the ongoing installation of two new 800,000-t/yr single-strand slab casters (completion scheduled for 2004), Kremikovtzi announced plans in December to install a Corex 3000-DRI [direct-reduced iron] plant that would replace three blast furnaces, a coke plant, and sinter plants. The new plant would become fully operational in 2009 at a cost of about \$301 million (Glasson, 2003; Steel Week, 2003). Losses incurred by Kremikovtzi in 2003 were mainly attributed to irregular deliveries of raw materials from the Port of Bourgas on the Black Sea (Shawcross, 2003).

**Lead and Zinc.**—The lead and zinc industry in Bulgaria was based on mining and processing operations near Plovdiv in the Ossogovo Mountains in western Bulgaria, near the Thundza River in southeastern Bulgaria, and in the Madan area near the Greek border. Lead and zinc smelting and refining operations were located in Kurdjali in the Madan area and in Plovdiv. The underground lead and zinc mining complex at Gorubso continued to be the country's major producer of lead and zinc ore. In 2003, total mine production of lead in concentrate increased by about 13% compared with that of 2002. The output of zinc (in concentrate) rose by about 26% compared with that of 2002 (table 1). The production of primary and secondary lead and zinc metals increased by 4.5% and 4.6%, respectively.

**Manganese.**—Production at the Obrotchishte manganese mine remained minimal in 2003 (table 1). Euromangan AD (Olbert Holdings of Switzerland), however, continued the development of new mining capacity that would amount to about 400,000 t/yr of manganese ore. Full production was scheduled to start in mid-2004. The Obrotchishte ore body is mainly the carbonite type (rhodocrosite) hosted in Oligocene-age volcano sedimentary deposits (aleurolite, clay, glauconitic sandstone, marl, and tuff) (Metal Bulletin, 2003).

### ***Industrial Minerals***

Bulgaria produced a broad range of industrial minerals suitable for chemical and construction industry uses. These included barite, calcareous rock, cement, clays, lime, salt, and silica. Bentonit AD and Kaolin AD were the major producers of industrial minerals in Bulgaria. Kaolin AD operated quarries and processing facilities at Vetovo and Kaolinovo (kaolin), Shoumen and Varna (quartz-feldspathic sands), and Konarata and Ustrem (potassium and sodium feldspars). Final output included kaolin, glass sand, and dry and wet silica sands.

Bentonit AD was a major Bulgarian producer of bentonite, perlite, and zeolite. With bentonite, zeolite, and perlite resources amounting to about 7.3 Mt, 2.8 Mt, and 0.8 Mt, respectively, Bentonit AD's corresponding processing capacities were reported to be 200,000 t/yr, 50,000 t/yr, and 150,000 cubic meters per year, respectively. In 2003, Silver & Barytes Ores Mining Co. S.A. of Greece announced the acquisition of 96.8% of Bentonite AD shares of stock (Silver & Barytes Ores Mining Co. S.A., 2003). Industrial lime production, which showed the largest gains in the industrial minerals sector in 2003, increased output by more than 2.5 times compared with output in 2002.

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<sup>2</sup>Where necessary, values have been converted from European Union euros (euro) to U.S. dollars (US\$) at the rate of euro0.9541=US\$1.00.

## **Mineral Fuels**

In 2003, total coal output rose by more than 4% compared with that of 2002. Coal mining, which supplied about 45% of the fuel needed to generate electric power, was the predominant fossil-fuel-producing sector in Bulgaria. The country's production of natural gas remained at about the output level of 2002; petroleum production, however, declined by about 18% compared with that of 2002.

## **Outlook**

Bulgaria's application to join the European Union carries a broad range of requirements, which include modernization of industrial plants and infrastructure. To meet these requirements, Bulgaria is expected to continue to develop its industrial minerals sector, including quarries and processing facilities for the production of construction materials. Exploration for precious metals also will expand.

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## **ROMANIA**

Romania's production of metals (aluminum, copper, lead and zinc, manganese, and steel and ferroalloys), industrial minerals, and mineral fuels was mainly of regional importance. Compared with 2002, major production gains in the metals sector in 2003 included those for primary refined copper (46%), copper in concentrate (12%), primary aluminum (4.6%), and crude steel (3.7%). Most industrial minerals showed production gains during the year (table 3).

In 2003, Romania's gross domestic product based on purchasing power parity rose by about 7% compared with that of 2002 (International Monetary Fund, 2004§). Industrial production increased by about 2.3% (U.S. Central Intelligence Agency, 2003, p. 444). The Government of Romania continued to develop policies that were aimed at reforming the industrial sector to raise competitiveness in preparation for privatization and to abate pollution from mine-based point sources (World Bank for Reconstruction and Development, The, 2004, p. 111–112).

## **Commodity Review**

### **Metals**

**Aluminum.**—In 2003, total aluminum production increased by about 3% compared with that of 2002; the production of primary aluminum increased by 4.6%. Alumina production declined by about 8% compared with that of 2002 owing to a temporary closure of the BBG Alum S.A. alumina refinery in Tulcea because of contractual obligation issues between BBG Alum and Romania's primary aluminium smelter, SC Alro S.A. (Alro). Following the resolution of contractual issues, production at BBG Alum was resumed in March; sales to Alro also were resumed and reportedly were to amount to about 100,000 t in 2004. Alro planned to develop diverse sources of alumina from such trading companies as Trafigura Beheer B.V. of the Netherlands. BBG Alum planned to seek greater international sales of alumina, which could include such trade partners as Glencore International A.G. of Switzerland. Romania's only other alumina refinery (Alor) remained closed because of high electricity costs (Marinas, 2003; Metal Bulletin, 2003c).

**Copper.**—Copper was mined in the northeastern part of the country (mainly at the Baia Sprie, the Cavnic, and the Lesul Ursului Mines), and in the southwestern part of the country (mainly at the Moldova Noua, the Rosia Poieni, and the Rosia Montana Mines). Generally, such major producing mines as Moldova Noua and Rosia Poieni were hoisting ore grading by about 0.35% Cu or less. Concentrates from these areas have been smelted and refined at Baia Mare and Zlatna. At Baia Mare, an Outokumpu flash smelter, an electrolytic copper refinery, and a continuous caster were operated by SC Allied Deals Phoenix SA. At Zlatna, SC Ampelum SA processed copper concentrates and operated a smelter and an electrolytic refinery (Moreno, 2000, p. 408). In 2003, the output of copper in concentrate increased by about 12% compared with that of 2002. The production of total refined copper increased by about 39% (table 3).

In 2002, RBG Resources Plc (the parent company of Allied Deals) offered the Baia Mare copper smelter and the Zlatna copper rod-and-wire-producing plant for sale. In 2003, both facilities were sold to Robitek Ltd. of Cyprus for \$3.5 million. Robitek's possession of RBG's Romanian copper-processing assets faced complications owing to an earlier sale of the assets by Romania's Asset Recovery Agency (AVAB). AVAB claimed that the law allowed the sale of assets of a company in arrears to which AVAB was a creditor (Metal Bulletin, 2003d; Reuters, 2003e).

**Gold.**—According to preliminary reports, Romania's mine production of gold declined by about 20% in 2003 compared with that of 2002. European Goldfields Ltd. of Toronto, Ontario, Canada, reported the transfer of licenses for mining the Bolcana, the Certej, and the Zlatna deposits to its subsidiary Deva Gold S.A. (80% owned) from Minvest S.A., which was a State-owned mining company. European Goldfields continued exploration work at Certej. Gold resources at the Certej deposit were estimated to be about 44 million metric tons (Mt) of ore with a grade of 1.9 grams per ton (g/t) gold. In 2001, European Goldfields reported the discovery of gold at nearby Teascu (1.62 to 1.79 g/t gold with a cutoff grade of 8 g/t) (European Goldfields Ltd, 2004).

The development of modern mining operations at Rosia Montana progressed in early 2003 as Government approvals were granted to Gabriel Resources Ltd. of Canada to begin the development of roads and other infrastructure that will serve the mine (Gabriel Resources Ltd., 2003). Concerns of the Romanian Government over possible environmental impact stemming from Rosia Montana's development, however, continued to affect the rate of the mine's development (Reuters, 2003a). Gabriel, which owned 80% of the Rosia Montana Gold Corporation, planned to develop an open pit operation to produce 13 Mt/yr of ore, which was expected to have a total yield of 311 t of gold and 1,617 t of silver. At a development cost of about \$253 million, the mine was expected to operate for about 16 years (Mining Journal, 2003).

In addition to the work undertaken at Rosia Montana, Gabriel continued exploration of the Frasin and the Rodu deposits in the Bucim exploration license area. By yearend 2003, Gabriel reported the completion of 51 drill holes (9,853 total drilled meters). Indicated and inferred resources at the Frasin deposit were estimated to contain about 21,340 kilograms (kg) (686,000 troy ounces) of gold and 58,039 kg (1,866,000 troy ounces) of silver. Exploration at both deposits was to continue in 2004 (Gabriel Resources Ltd., 2004).

European Goldfields Ltd. continued exploration work at Certej. Indicated gold resources at the Certej deposit were estimated to be about 35 Mt of ore at grades that averaged 2.1 g/t gold and 10.1 g/t silver. European Goldfields indicated that the quantity and quality of Certej's ore warranted the development of an open pit mine to work the deposit (European Goldfields Ltd., 2004).

**Iron and Steel.**—The iron and steel sector reported continued growth in 2003. The production of pig iron increased by about 3% compared with that of 2002; the production of crude steel and rolled semimanufactures increased by 4% and 19%, respectively (table 3).

In 2003, the main events in Romania's denationalization process of the steel industry included the sale of Siderurgica SA Hunedoara to LNM Holdings NV of the United Kingdom. In preparation for the sale, Romania's privatization agency APAPS announced plans to reduce the workforce at Hunedoara by about 50% (Metal Bulletin, 2003e). Despite subsequent worker protests in the area, the plan, which was based on conditions set by the International Monetary Fund, was put into effect. By yearend, Hunedoara, which had a capacity to produce 500,000 t/yr of long products, was sold along with pipe producer Perotub Roman for about \$126 million (Reuters, 2003d). Perotub, which also was located in Hunedoara, was to receive about 350,000 t/yr of round billet from Siderurgica Hunedoara in addition to about 150,000 t/yr of round billet from LNM's affiliate Ispat Sidex SA in Galati (Metal Bulletin, 2003b). Additionally, LNM acquired the Tepro Iasi pipe plant for \$15.6 million (Reuters, 2003c).

Ispat, which was the country's largest iron and steel complex and was acquired fully at the end of 2001 by LNM, reported the implementation of an investment program valued at about \$141 million that centered on the installation of a new two-strand slab caster. Voest-Alpine Industrieanlagenbau AG of Austria was scheduled to undertake the installation of the 1,750,000-ton-per-year continuous caster in December 2003. Ispat also reported that the steel producer had become profitable in 2003 (Dow Jones Business News, 2003; Metal Bulletin, 2003a).

In a departure from the privatization trend in the steel sector, the assets of CSR S.A. Resita reverted to Government ownership because of nonfulfillment of investment and other sales contract provisions by United States-based private owner Noble Ventures Marketing. Negotiations between the Government of Romania and Russian pipe producer TMK Pipe Metallurgical Company were conducted at yearend about the sale of CSR S.A. Resita to the Russian pipe producer (Metal Bulletin, 2003f, g; Reuters, 2003b).

**Lead and Zinc.**—Relatively low grade lead and zinc ores were produced at underground mines in the Baia Mare, the Borsa, the Certej, and the Rodna districts; the ores graded between 0.4% lead and 0.6% zinc and 1.0% lead and 1.2% zinc. Romania's lead and zinc ores also contained copper (0.35%), and associated antimony, bismuth, cadmium, gold, and silver. Because of the complex mineralogy of the lead and zinc ores, concentrates produced from them have been uneven. Metal recovery from concentrates has ranged from between 50% and 75% for lead and zinc. Smelting and refining of lead and zinc from domestic and imported ores and

concentrates was carried out by Sometra S.A. In 2003, Romania's production of lead in concentrate increased by about 20% compared with that of 2002; the production of zinc in concentrate rose by about 10% (table 3).

### ***Industrial Minerals***

Romania was known to have a broad range of industrial minerals that included barite, various calcareous rocks, clays, granitic/pegmatitic sources of feldspar and mica, graphite, gypsum, salt, and silica group minerals. Seven privately owned companies and one State-owned company were involved in the mining and quarrying of industrial minerals. The modernization of the country's economy and infrastructure was expected to increase the domestic demand for industrial minerals and construction materials. In 2003, the production of cement increased by about 5.4% compared with that of 2002. Although sand and gravel production declined by about 35% compared with that of 2002, it was still considerably greater than in 1999, 2000, and 2001 when 748,000 t, 814,000 t, and 733,000 t, respectively, was produced. Major production increases were registered by the country's diatomite and feldspar mining sectors with gains of about 50% and 38%, respectively, compared with comparable levels attained in 2002.

### ***Mineral Fuels***

The petroleum extracting and refining industries historically have been among Romania's leading industrial sectors. Although small by world standards, the petroleum industry continued to be an important component of the country's energy balance. Estimates of petroleum resources have ranged from 1.0 to 1.6 billion metric tons (Gt). The extraction of crude petroleum in recent years, however, has exhibited a declining trend. From 1997 through 2003, inclusively, petroleum output declined each year by about 2%, 3%, 2%, 2%, 1%, 3%, and 2%, respectively, compared with the preceding year (table 3). The output of natural gas has shown a similar declining trend in production; in 2003, natural gas production declined by 3% compared with that of 2002. Coal was produced at 34 mines from resources that amounted to 3.5 Gt, of which 75% was lignite; 22%, bituminous coal; and 3%, brown coal. Coal accounted for about 60% of the primary fuel for the country's principal electric power stations (Lynch, 1999, p. 7). The total output of marketable coal in 2003 increased by about 9% compared with that of 2002.

### **Outlook**

Romania's application to join the European Union carries a broad range of requirements, which include modernization of industrial plant and infrastructure. To meet these requirements, Romania is expected to continue to develop its industrial minerals sector, including quarries and processing facilities for the production of construction materials. As in Bulgaria, gold exploration is expected to continue to be an important aspect of foreign investment in the country's mineral industry.

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TABLE 1  
BULGARIA: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003
<b>METALS</b>					
Aluminum, metal, secondary	4,438	3,190	1,568	2,062	2,000 <sup>c</sup>
Bismuth, metal <sup>c</sup>	40	40	40	40	40
Cadmium, metal, smelter	217	331 <sup>r</sup>	333 <sup>r</sup>	345 <sup>r</sup>	307
Copper:					
Ore:					
Gross weight thousand tons	22,346	22,829	24,878	26,030	26,415
Cu content <sup>c</sup> do.	113	113	115	112 <sup>r</sup>	116 <sup>3</sup>
Concentrate:					
Gross weight do.	482	462	438	464 <sup>r</sup>	458
Cu content do.	96	92	88	93 <sup>r</sup>	92
Metal, primary and secondary:					
Smelter	107,000	178,000	157,000	181,000	199,300
Refined, electrolytically	21,000	32,400	34,400	40,000	42,000
Gold, metal kilograms	2,743	2,347	2,540	2,612	2,142
Iron and steel:					
Iron ore:					
Gross weight thousand tons	699	559	325	373	466
Fe content do.	223	178	92	105	127
Iron concentrates do.	361	304	240	167	248
Metal:					
Pig iron for steelmaking do.	1,152	1,220	1,211	1072	1100 <sup>c</sup>
Ferroalloys, ferrosilicon <sup>c</sup> do.	10	10	10	10	10
Steel, crude do.	1,890	2,023	1,942	1,860	1,950
Semimanufactures, rolled do.	1,535	1,455	1,598 <sup>r</sup>	1,539 <sup>r</sup>	1,500 <sup>c</sup>
Lead:					
Mine output, Pb content	14,000	14,000	16,000	24,000	31,000
Concentrate:					
Gross weight	25,208	15,019	26,400	31,108 <sup>r</sup>	35,200
Pb content <sup>c</sup>	17,000	10,500	18,500	21,800 <sup>r</sup>	24,600
Metal, refined, primary and secondary	81,600	84,100	88,300	66,000	69,000
Manganese ore:					
Gross weight	--	--	1,516	4	4
Mn content <sup>c</sup>	--	--	450	--	--
Silver, mine output, Ag content	59	55	57	60	62
Tin, metal	10 <sup>c</sup>	10	10	10	10 <sup>c</sup>
Uranium, oxide, U content <sup>c</sup>	600	600	600	600	600
Zinc:					
Mine output, Zn content	12,000	10,000	10,600	25,800	31,000
Concentrate:					
Gross weight	19,560	18,096	23,301	28,672	36,200
Zn content <sup>c</sup>	10,200	9,400	12,100	14,900	18,800
Metal, smelter, primary and secondary	83,700	84,200	88,600	83,000	86,800
<b>INDUSTRIAL MINERALS</b>					
Asbestos fiber, all grades	300 <sup>c</sup>	300	300	300	300
Barite ore, run of mine	1,124,000	875,000	825,000	656,000	637,000
Cement, hydraulic thousand tons	2,060	2,209	2,088	2,137 <sup>r</sup>	2,100 <sup>c</sup>
Clays:					
Bentonite do.	232	296	320	212 <sup>r</sup>	146
Kaolin, washed do.	140 <sup>c</sup>	150	150	160	170 <sup>c</sup>
Refractory do.	48	34	37	38	31
Feldspar do.	28	22	23	34	4
Fluorspar <sup>c</sup> do.	2	2	2	2	2
Gypsum and anhydrite:					
Crude do.	149	170	167	156 <sup>r</sup>	168
Calcined do.	55 <sup>c</sup>	65	50	50	50 <sup>c</sup>

See footnotes at end of table.

TABLE 1--Continued  
BULGARIA: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003
INDUSTRIAL MINERALS--Continued					
Lime, industrial do.	1,068	1,388	1,248 <sup>r</sup>	1,136 <sup>r</sup>	2,902
Limestone and dolomite <sup>e</sup> do.	11,000	11,000	11,000	11,000	11,000
Nitrogen, N content of ammonia do.	378	647	580	328	321
Perlite do.	13	17	12	11 <sup>r</sup>	17
Pyrites, gross weight <sup>e</sup> do.	150	150	150	150	150
Salt, all types do.	1,300	1,700	1,931	1,800	1,882
Sand and gravel thousand cubic meters	2,829	2,291	2,375	2,385 <sup>r</sup>	2,500 <sup>e</sup>
Silica (quartz sand) thousand tons	533	690	677	607	610
Sodium carbonate, calcined <sup>e</sup> do.	800	800	800	800	800
Sulfur: <sup>e</sup>					
Sulfur content of pyrite	50,000	50,000	50,000	50,000	50,000
Byproduct	50,000	50,000	50,000	50,000	50,000
Total	100,000	100,000	100,000	100,000	100,000
Sulfuric acid	456,483 <sup>r</sup>	641,430 <sup>r</sup>	620,315 <sup>r</sup>	715,018 <sup>r</sup>	750,000 <sup>e</sup>
MINERAL FUELS AND RELATED MATERIALS					
Coal, marketable:					
Anthracite thousand tons	17	18	14	13	9
Bituminous do.	106	100	101	109	44
Brown do.	3,074	3,211	3,151	3,232	3,044
Lignite do.	22,696 <sup>r</sup>	23,765	23,856	23,202	24,597
Total do.	25,893	27,094	27,122	26,556	27,694
Coke <sup>e</sup> do.	1,200	1,200	1,200	1,200	1,200
Natural gas, marketed million cubic meters	27	15	22	11	11
Petroleum:					
Crude, reported thousand tons	39	41	32	33	27
Refinery products <sup>e</sup> thousand 42-gallon barrels	25,000	25,000	25,000	25,000	25,000

<sup>e</sup>Estimated. <sup>r</sup>Revised. --Zero.

<sup>1</sup>Table includes data available through October 2004.

<sup>2</sup>In addition to commodities listed, chromite, magnesite, palladium, platinum, tellurium, and uranium and a variety of crude construction materials (common clays, dimension stone, and crushed stone) are produced, but available information is inadequate to make reliable estimates of output level.

<sup>3</sup>Reported figure.

TABLE 2  
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Cement	Reka Devnia	Devnia	1,825.
Do.	Zlatna Panega	Panega	1,300.
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:			
Bituminous	Economic Mining and Power Combine (Smek) Balkanbass	Balkan coal basin in central Bulgaria, northwest of Silven	445.
Brown	G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.	Others	Bobov Dol and Pirin in western Bulgaria	3,100.
Lignite	SMEK East Maritsa	East Maritsa coal basin near Zagora	25,000.
Do.	Others	Marbas, Pernik, and Bobov Dol coal basins	5,300.
Copper (Cu):			
Concentrate, Cu content	Asarel-Medet AD.	Panagurishte, Pazardzhik District	25.
Do.	Chelopech Ltd.	Srednogie, Sofia District	5.
Do.	Bradtze	Malko Turnovo	2.
Do.	Elatzite-Med Ltd.	Srednogie, Sofia District	15.
Do.	Rosen	Burgas, near the Black Sea	1.
Do.	Tsar Asen	Srednogie, Sofia District	2.
Do.	Burgaskii Mines Ltd., Zidorovo	Burgas, near the Black Sea	0.5.
Metal, refined	N.V. Umicore S.A. Pirdop Copper Smelter & Refinery	Srednogie, Sofia District	120.
Iron ore	Kremikovtzi Iron and Steel Works	Kremikovtzi	2,000.
Lead-zinc (Pb-Zn):			
Concentrate, Pb-Zn content	Gorubso Co.	Erma Reka, Kurdjali, Laki, and Rudozem, all in Madan area near Greek border	59 Pb, 47 Zn.
Do.	Madzharovo Ltd.	Near Plovdiv	3 Pb, 2 Zn.
Do.	Ossogovo Ltd.	Ossogovo Mountains, western Bulgaria	3 Pb, 2 Zn.
Do.	Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 Pb, 0.8 Zn.
Metal:			
Pb, refined	KCM SA [formerly Dimitur Blagoev]	Plovdiv	44
Do.	Lead and Zinc Complex Ltd.	Kurdjali	60.
Zn, smelter	KCM SA [formerly Dimitur Blagoev]	Plovdiv	60.
Do.	Lead and Zinc Complex, Ltd.	Kurdjali	30.
Manganese ore	Mangan Ltd. (Obrotchishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, in northwest Bulgaria	( <sup>1</sup> ).
Petroleum:			
Crude	do.	do.	( <sup>1</sup> ).
Refined	barrels per day Economic Trust for Petroleum Products	Refineries in Burgas, Plevna, and Ruse	260,000.
Steel, crude	Kremikovtzi Iron and Steel Works	Near Sofia	2,300
Do.	Stomana Iron and Steel Works	Pernik	1,300.

<sup>1</sup>Insignificant capacity.



TABLE 3  
ROMANIA: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003
<b>METALS</b>					
<b>Aluminum:</b>					
Bauxite, gross weight	--	--	--	--	--
Alumina, calcined, gross weight	277,388	416,587	319,403	361,047 <sup>r</sup>	332,852 <sup>3</sup>
<b>Ingot including alloys:</b>					
Primary	174,452	179,038	181,831	187,052 <sup>r</sup>	195,616 <sup>3</sup>
Secondary	146	2,305	682	3308 <sup>r</sup>	273 <sup>3</sup>
Total	174,594	181,343	182,513	190,360	195,889
Bismuth, mine output, Bi content <sup>e</sup>	40	40	40	40	40
Cadmium metal, smelter	--	--	--	--	--
<b>Copper:</b>					
Mine output, Cu content of concentrate	16,807	16,099	19,185	18,962 <sup>r</sup>	21,317 <sup>3</sup>
<b>Metal:</b>					
<b>Smelter:</b>					
Primary	24,010	16,429	8,979 <sup>r</sup>	8,871	4,456 <sup>3</sup>
Secondary <sup>e</sup>	2,000	2,000	2,000	2,000	500
Total	24,010	18,429	10,979	10,871	4,956
<b>Refined:</b>					
Primary	20,294	15,303	18,522	11,453	16,672 <sup>3</sup>
Secondary <sup>e</sup>	4,000	4,000	4,000	2,000	2,000
Total	24,294	19,303	22,522	13,453	18,672
Gold, mine output, Au content <sup>e</sup> kilograms	500	500	500	500	400
<b>Iron and steel:</b>					
<b>Iron ore:</b>					
Gross weight thousand tons	131	116	292	342 <sup>r</sup>	304 <sup>3</sup>
Metal content do.	71	55	76	89 <sup>r</sup>	79
<b>Metal:</b>					
Pig iron do.	3,006	3,066	3,243	3,979 <sup>r</sup>	4,101 <sup>3</sup>
<b>Ferroalloys:</b>					
Ferrosilicon	5,000	8,309	5,823	--	-- <sup>3</sup>
Ferromanganese	25	1,989	384	--	-- <sup>3</sup>
Ferrosilicomanganese	550	62,320	71,921	84,720 <sup>r</sup>	141,899 <sup>3</sup>
Silicon metal <sup>e</sup>	--	200	200	200	100
Steel, crude thousand tons	4,355	4,672	4,936	5,490 <sup>r</sup>	5,690 <sup>3</sup>
<b>Semimanufactures:</b>					
Pipes and tubes do.	348	465	665	562 <sup>r</sup>	218 <sup>3</sup>
Rolled products do.	3,377	3,687	3,582 <sup>r</sup>	3,907 <sup>r</sup>	4,653 <sup>3</sup>
<b>Lead:</b>					
Mine output, Pb content of concentrate	20,484	18,750	19,676	15,136 <sup>r</sup>	18,102 <sup>3</sup>
Smelter, primary <sup>e</sup>	15,000	15,000	15,000	15,000	16,000
<b>Refined:<sup>e</sup></b>					
Primary	13,000	25,000	24,000	23,100 <sup>r</sup>	23,100 <sup>3</sup>
Secondary	3,000	3,000	3,000	3,000	5,000
Total	16,000	28,000	27,000	29,000	28,100
<b>Manganese:</b>					
Ore, gross weight thousand tons	60	24	70	60	90
<b>Concentrate:<sup>4</sup></b>					
Gross weight do.	42	19	55	40	60
Mn content do.	11	5	14	12	15 <sup>3</sup>
Silver, mine output, Ag content	18	18	12	15	18 <sup>3</sup>
<b>Zinc:</b>					
Mine output, Zn content of concentrate	26,536	27,452	29,786	21,250	23,464 <sup>3</sup>
Metal, smelter, primary and secondary	29,000	51,900	47,200	51,600	52,000 <sup>3</sup>
<b>INDUSTRIAL MINERALS</b>					
Barite, processed	4,641	4,266	2,851	100	--
Cement, hydraulic thousand tons	5,580	6,058	5,668	5,680	5,988 <sup>3</sup>

See footnotes at end of table.

TABLE 3--Continued  
ROMANIA: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003
<b>INDUSTRIAL MINERALS--Continued</b>					
Clays:					
Bentonite:					
Run of mine <sup>c</sup>	45,000	75,000	60,000	40,000	40,000
Marketable	19,609	37,687	24,779	15,389 <sup>r</sup>	17,637 <sup>3</sup>
Kaolin:					
Run of mine <sup>c</sup>	73,000	70,000	70,000	71,000	70,000
Marketable	23,586	18,942	21,867	22,517 <sup>r</sup>	21,724 <sup>3</sup>
Diatomite	11,592	8,890	9,743	20,922 <sup>r</sup>	31,298 <sup>3</sup>
Feldspar	36,635	37,157	43,037	51,959 <sup>r</sup>	71,717 <sup>3</sup>
Fluorspar <sup>c</sup>	15,000	15,000	15,000	15,000	15,000
Graphite	1,041	1,251	1,176	1,001	1,014 <sup>3</sup>
Gypsum thousand tons	305	218	275	421 <sup>r</sup>	394 <sup>3</sup>
Lime do.	1,464	1,666	1,790 <sup>r</sup>	1,918 <sup>r</sup>	2,025 <sup>3</sup>
Nitrogen, N content of ammonia do.	687	1,033	949 <sup>r</sup>	930 <sup>r</sup>	1,180 <sup>3</sup>
Pyrites, gross weight do.	68	70 <sup>e</sup>	70 <sup>e</sup>	70	70
Salt:					
Rock salt do.	100	52	49	46	47 <sup>3</sup>
Other do.	2,199	2,256	2,176	2,211	2,368 <sup>3</sup>
Total do.	2,299	2,308	2,224	2,257	2,415
Sand and gravel do.	748	814	733	1569 <sup>r</sup>	1,013 <sup>3</sup>
Sodium compounds, n.e.s.:					
Caustic soda do.	289	343	346	353 <sup>r</sup>	408 <sup>3</sup>
Soda ash, manufactured, 100% Na <sub>2</sub> CO <sub>2</sub> basis do.	431	391	448	454 <sup>r</sup>	407 <sup>3</sup>
Sulfur:					
S content of pyrites do.	17	10	2	--	--
Byproduct, all sources <sup>e</sup> do.	200	200	200	200	200
Total <sup>e</sup> do.	217	210	202	200	200
Sulfuric acid do.	234	181	58	58	65 <sup>3</sup>
Talc	8,289	7,850	7,270	7,310 <sup>r</sup>	10,082 <sup>3</sup>
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Carbon black	12,490	14,756	15,538	8,106	2,000 <sup>3</sup>
Coal, washed:					
Anthracite and bituminous: thousand tons	2,751	3,251	14 <sup>r</sup>	13	8 <sup>3</sup>
Of which:					
For coke and semicoke production do.	110	13	14	13	8 <sup>3</sup>
For other uses do.	1	--	--	--	-- <sup>3</sup>
Brown do.	--	291	324	245 <sup>r</sup>	224 <sup>3</sup>
Lignite do.	22,472	25,752	32,457	30,154 <sup>r</sup>	32,819 <sup>3</sup>
Total do.	25,223	29,294	32,795	30,446	33,051
Coke:					
Metallurgical do.	1,593	1,534	1,343 <sup>r</sup>	1,680 <sup>r</sup>	1,510 <sup>3</sup>
Other do.	--	79	70	186 <sup>r</sup>	--
Total do.	1,593	1,613	1,413	1,866 <sup>r</sup>	1,510
Gas, natural, gross:					
Associated million cubic meters	1,164	1,249	1,424	1,403 <sup>r</sup>	1,363 <sup>3</sup>
Nonassociated do.	13,413	13,358	12,666 <sup>r</sup>	12,244 <sup>r</sup>	11,842 <sup>3</sup>
Total do.	14,577	14,607	14,090	13,647	13,205
Petroleum:					
Crude:					
As reported thousand tons	6,154	6,042	6,011	5,810 <sup>r</sup>	5,662 <sup>3</sup>
Converted thousand 42-gallon barrels	45,866	45,300	45,100	44,000	42,500
Refinery products <sup>c</sup> do.	77,265	75,000	75,000	75,000	75,000

<sup>c</sup>Estimated. <sup>r</sup>Revised.

<sup>1</sup>Includes data available through September 2004.

<sup>2</sup>In addition to the commodities listed, antimony, asbestos, and a variety of crude construction materials are produced, and molybdenum may have been a byproduct of copper from 1988 on; output is not reported quantitatively and available information is inadequate to make reliable estimates of output level.

<sup>3</sup>Reported figure.

<sup>4</sup>Estimated series were based on published data on concentrate production.

TABLE 4  
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Alumina	Soc Com Alor SA	Plant at Oradea, near Hungarian border	250.
Do.	BBG Alum S.A. (51%-owned by the Balli Group of the United Kingdom and the Bayraktar Co. of Turkey)	Plant at Tulcea, Danube Delta	400.
Aluminum, primary	SC Alro S.A. (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	270.
Barite	Ministry of Industry	Ortra mine, Rosia Montana, southwest of Cluj	100.
Bauxite	do.	Oradea-Dobresti Mining Complex, near Hungarian border	350.
Cement	Cimentul SA Turda	Plant at Turda, 600 kilometers from port of Constanta	cement, 1360; clinker, 850.
Do.	Cimentul SA Cimus	Plant at Cimpulung, about 499 kilometers from port of Constanta	cement, 2,200; clinker, 1,360.
Do.	Moldocim SA Bicaz	Plant at Bicaz, about 450 kilometers from port of Constanta	cement, 3,100; clinker, 1,520.
Do.	Romcif SA Fieni	Plant at Fieni, about 420 kilometers from port of Constanta	cement, 1,600; clinker, 960.
Do.	Romcim SA	Plant at Alesd, 812 kilometers from port of Constanta	cement, 3,500. clinker, 2,120.
Do.	do.	Plant at Hoghiz, 437 kilometers from port of Constanta	cement, 2,200; clinker, 1,520.
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	cement, 3,500; clinker, 1,980.
Do.	do.	Plant at Jiu, about 533 kilometers from the port of Constanta	cement, 3,000; clinker, 2,045.
Coal:			
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400.
Lignite	Societatea National a Lignitului Oltenia-Targu Jui	Jiu Valley, Oltenia County, north of Craiova	20,300.
Do.	Societatea National a Carbunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700.
Copper:			
Ore (concentrate)	Compania Nationala REMIN S.A. and Compania Nationala Minvest	Baia Mare, Baia Sprie, and Cavnic mines, northwestern area near the Ukrainian border; Rosia Montana, Noud, Borsa Balan, and Lesul Ursului Mines--in east-west arc along Carpathian range; Rosia Poieni Mine; and Moldova Noua Mine, southwest near Danubian border with Yugoslavia	180.
Metal	SC Allied Deals Phoenix SA	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the Northwestern area, near the Ukrainian border	40.
Do.	SC Ampelum SA	Zlatna smelter and refinery, Apuseni, northwest Romania	13.
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280.

TABLE 4--Continued  
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Iron ore		Compania Nationala Minvest	Mining complex at Hunedoara, in west-central Romania	1,320.
Do.		do.	Resita Mining Complex, southwestern Romania, near Yugoslav border	660.
Do.		do.	Napoca-Cluj Mining Complex, northwestern Romania on the Somesul River	990.
Lead in ore		Compania Nationala REMIN S.A.	Baia Mare Mine, near Ukrainian and Hungarian borders	24.
Do.		Compania Nationala Minvest	Balan Mine, 50 kilometers southwest of Piatra Neamt	10.
Lead metal		Sometra S.A.	Imperial Smelter at Copsa Mica, central Romania, on the Tirnava Mare River	42.
Natural gas	million cubic feet per year	Ministry of Industry, Department of Energy	Tirgu Mures Field at Tirgu Mures, north-central Romania	996,000.
Do.	do.	do.	Ploesti Field, 50 kilometers north of Bucharest	249,000.
Petroleum, crude	barrels per day	do.	Ploesti-Teleajen, Pitesti, and Tiroviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau, east-central Romania near the Siretul River; and West Carpathian Field, southeastern Carpathian Mountains, between the west bank of the Olt River and Tirgu Jiu	250,000.
Petroleum, refined	do.	do.	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	664,000.
Steel		Gavazzi Steel SA (formerly Otel Rosu)	Caras-Severin, southeastern region, near Yugoslav border	400.
Do.		SC Industrie Sarmei SA	Campia Turzii, Cluj, northwestern Romania	300.
Do.		Ispat Sidex SA Galati (Ispat, India and United Kingdom)	Danube River, north of Brail, near the Ukrainian border	10,000.
Do.		Siderurgica SA Hunedoara (LNM Holdings NV, United Kingdom)	West-central Romania, near Calan	2,135.
Do.		CSR S.A. Resita	Southwestern Romania, about 20 kilometers southwest of Caransebes	1,200.
Do.		Siderica SA Calarasi	Near the Bulgarian border close to the Danube	2,200.
Do.		COST SA Tiroviste	Tiroviste, Dimbovita, near Bucharest	1,100.
Zinc:				
In ore		Compania Nationala Minvest	Baia Mare, near Ukrainian and Hungarian borders	60.
Metal		Sometra S.A.	Imperial Smelter at Copsa Mica, Tirnava River, central Romania	66.